



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/608,606	06/27/2003	Kong Weng Lee	70030260-1	2249
57299	7590	04/19/2006		
AVAGO TECHNOLOGIES, LTD. P.O. BOX 1920 DENVER, CO 80201-1920				
			EXAMINER CRANE, SARA W	
			ART UNIT 2811	PAPER NUMBER

DATE MAILED: 04/19/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/608,606	Applicant(s) LEE ET AL.	
	Examiner Sara W. Crane	Art Unit 2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED. (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 January 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2 and 4-28 is/are pending in the application.
- 4a) Of the above claim(s) 9-11 and 13-18 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,4-8,12 and 19-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1-2, 12, and 19-22 are rejected under 35 U.S.C. 103(a) as being obvious over Sakamoto et al. in view of Freyman et al.

With respect to claim 1, as noted in the previous Office action, Sakamoto et al. figures 11 show a planar substrate, a filled through hole TH, and a conductive die mounting pad 14 and a conductive connecting pad 16 on different surfaces of the substrate. Formation of the pads is begun in figure 11B prior to filling of the through hole in figure 11C. Freyman et al. teaches a method of fabricating a die attachment substrate in figures 2, where the through holes 102 are filled with conductor (paste such as tungsten/glass, column 2, line 62) prior to formation of die attach areas 212, 218, 220 (figures 2f and 2g) and conductive pads 208 (figure 2c) on the opposite surface of the substrate. It would have been obvious to form the through hole fill in the Sakamoto device as taught by Freyman et al., prior to forming the rest of the circuit features, in order to obtain the (ultra) high density of pads, taught as desirable by Freyman et al. at column 2, lines 20-21. Alternatively, the Freyman reference alone teaches each of the claim elements, with the steps of figure 2, for example, being performed in the order recited in claim 1.

Claims 2, 12, and 19 are discussed in the Office action of 4 October, 2005, and would have been obvious for the reasons noted there.

Art Unit: 2811

With respect to claim 20, each of the references teaches to fill the through hole with an electrically conductive interconnecting element. With respect to claim 21, the Freyman element 102 includes tungsten. With respect to claim 22, the Freyman conducting paste 102 has been introduced into the through holes prior to figure 2a.

Claims 4-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claims 1-2, 12, and 19-22 above, and further in view of Kobayashi.

See reasons of record in the previous Office action.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claims 1-2, 12, and 19-22 above, and further in view of Kobayashi and Rapoport.

See reasons of record in the previous Office action.

Claims 23-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claims 1-2, 12, and 19-22 above, and further in view of Asai et al.

With respect to claim 23, Asai column 35, lines 35-36, teaches to squeeze a resin filler into a through hole. It would have been obvious to squeeze a slug of the Freyman paste into the Freyman through hole in the same manner, in order to get the paste into the hole. With respect to claim 24, the slug must have a diameter smaller

than the hole, at least after it is in the hole. With respect to claim 25, the Freyman slugs 102 are flush with the substrate surfaces. With respect to claim 26, the Freyman slugs include tungsten. With respect to claim 27, the Freyman slugs 102 occupy the volume of the through hole. With respect to claim 28, the Freyman material is described as a paste, which would have adhesive properties.

Conclusion


Applicant's arguments filed with respect to the pending claims have been fully considered but they are not persuasive. Applicant argues that the Sakamoto reference teaches a plating applied to the inner surface of the through hole. Examiner did not find any reference to the inner surface of the through hole in that reference. The figures show the through hole filled by the conductor. A quick word search on "through hole," "filled," and "plating" reveals many references which teach to fill a through hole by plating, so it is certainly possible to produce the device of the Sakamoto figures by the method taught by Sakamoto et al. The reference is understood to teach exactly what is shown in the figures. However, the Freyman reference was cited as an alternative teaching of a filled through hole. Applicant also argues that the through holes of Sakamoto would extend through the structures 14 and 16 above and below. Again, this is not shown in the figures, but the Freyman reference was cited as an alternative teaching of the formation of conductive pads above and below a through hole, formed after the through hole is filled.

Art Unit: 2811

Any inquiry concerning this communication or earlier communications from the examiner should be directed to S. Crane, whose telephone number is (571) 272-1652.

The supervisor for Art Unit 2811, Eddie Lee can be reached on (571) 272-1732. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Sara W. Crane
Primary Examiner
Art Unit 2811